	Application No.	Applicant(s)
Notice of Allowability	09/753,254	HELDER ET AL.
	Examiner	Art Unit	
	Todd Ingberg	2124	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *6/17/2004*.

2. ☒ The allowed claim(s) is/are *1-26*.

3. ☒ The drawings filed on *29 December 2000* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of
Paper No./Mail Date _____ .

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

EXAMINER'S AMENDMENT

1.   An examiner's amendment to the record appears below. Should the changes and/or

additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR

1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the

payment of the issue fee.

The title of the application has been amended as follows:

MECHANISM TO AVOID EXPLICIT PROLOGS IN SOFTWARE PIPELINED

DO-WHILE LOOPS

REASONS FOR ALLOWANCE

2.   The following is an examiner's statement of reasons for allowance:

Applicant on page 7 of the response states that the Tirumalai reference teaches the operations of DO loop (often referred to as FOR loops) and does not teach the operations of DO-WHILE loops. The Applicant is correct. The reference does in fact teach many aspects of what is grossly old and well known in FOR loop optimization.

Arguments Toward Predicates

Tirumalai does not teach or suggest "assigning a predicate register for each exit of a DO-Loop. However, Muthukumar et al in USPN #6,571,385 does each the use of a predicate at each exit of a DO-WHILE loop for pipelining. This limitation is not novel. Applicant's term speculative instruction is the portion of the loop control that makes the DO loop a DO WHILE loop.

Argument's Toward LIVE-IN Values

Applicant's statements that the Tirumalai teaches the mechanisms to provide for dependency analysis is correct as is the statement that the reference does not go to the level of actually teaching how. For "FOR" loops this topic is well documented. For DO-WHILE loops references are scarce. The closest reference of record is the Muthukumar et al USPN #6,820,250 reference.

When taken singularly or in combination the combination of the two Muthukumar patents does not teach the claimed invention of the instant application. The instant invention provides of pipelining of DO-WHILE loops with preservation of LIVE-IN values.

Unlike the pipelining of FOR loops, the pipelining of DO-WHILE loops is relatively

new. As evident by a well published author on compiler design, Steven Muchnick in his text

book "Advanced Compiler Design and Implementation" published August 19, 1997 on page 551,

he states the loop optimization of loops where the number of iterations is unknown is not

possible. *"Since software pipelining moves a fixed number of iterations of a loop out of the loop

body, we must know in advance that the loop is repeated at least that many times, or we must

generate code that tests this, if possible, at run time and that chooses to execute either software

pipelined version of the loop or one that is not. Of course some loops it is not possible to

determine the number of iterations they take without executing them, and software pipelining

cannot be applied to such loops."*. The claimed invention appears to be a novel approach.

Any comments considered necessary by applicant must be submitted no later than the

payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for

Allowance."

Correspondence Information

3.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to **Todd Ingberg** whose telephone number is **(571) 272-3723** (as of

October 23, 2004).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, **Kakali Chaki** can be reached on **(571) 272-3719**. Please, note that as of August 4,

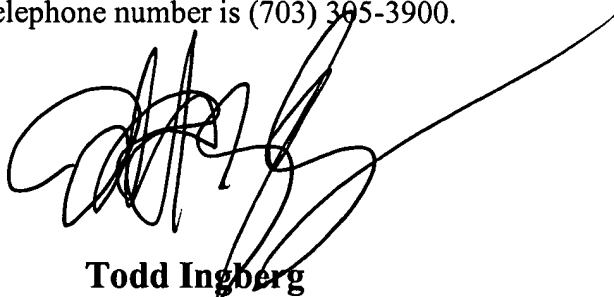2003 the **Official FAX number** changed to **(703) 872-9306**.

Also, be advised the United States Patent Office **new address** is

Post Office Box 1450

Alexandria, Virginia 22313-1450

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703) 305-3900.

Todd Ingberg
Primary Examiner
Art Unit 2124
November 28, 2004